

Sheet #5  
Normalization

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1. the relation is in 1NF

\* 2NF

Book( accno, author, title, borrower-no, pubyear)

author( author, author-address, accno )

~~borrow~~

borrower( borrower-no, Borrower-Name )

i) accno is the primary key for relation Book

accno  $\rightarrow$  author

accno  $\rightarrow$  title

accno  $\rightarrow$  borrower-no

accno  $\rightarrow$  pubyear

author is the primary key for relation author

author  $\rightarrow$  author-address

author  $\rightarrow$  accno

borrower-no is the primary key for relation borrower

borrower-no  $\rightarrow$  borrower-Name

2) - The relation satisfy 1NF as there is no repeated values or multivalued attributes.

- The relation satisfy 2NF as there is no partial functional dependencies.

- To convert relation to 3NF, we will remove transitive dependencies.

$R(\underline{\text{saleID}}, \text{salesman}, \text{regNo})$   $\text{saleID} \rightarrow \text{salesman}$   
 $\text{saleID} \rightarrow \text{regNo}$

$R1(\underline{\text{salesman}}, \text{office})$   $\text{salesman} \rightarrow \text{office}$

$R2(\underline{\text{regNo}}, \text{make})$   $\text{regNo} \rightarrow \text{make}$

PartNo	Descp.	vendorName	Address	unit cost
1234	Logic chip	Fast chips	Cupar info	10.00
1234	logic chip	smart chips	phoenix	8.00
5678	Memory chip	Fast chips	Cupar info	3.00
5678	Memory chip	Quality chips	Austin	2.00
5678	Memory chip	smart chips	phoenix	5.00

b) Part Supplier (partNo, Descp, vendorname, Address, unit cost)

$\text{partNo} \rightarrow \text{Descp}$

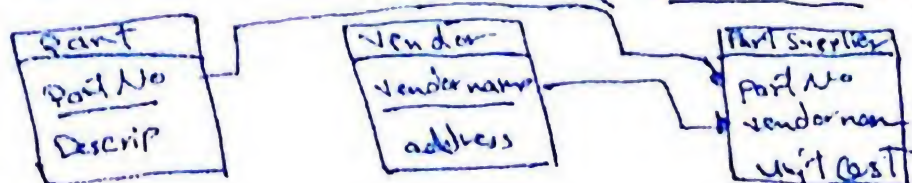
$\text{vendorname} \rightarrow \text{Address}$

$(\text{partNo}, \text{vendorName}) \rightarrow \text{unit cost}$

a) 3NF: Part Supplier (partNo, vendorname, unit cost)

Part (partNo, Descp)

Vendor (vendorname, address)





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a) Grade Report ( Student ID, Student Name, Campus address,  
Major, Course ID, Course title, instructor name,  
instructor location, grade)

Student ID  $\rightarrow$  Student Name, Campus address, major

Course ID  $\rightarrow$  Course title, instructor name

instructor name  $\rightarrow$  instructor location

(Student ID, Course ID, instructor name)  $\rightarrow$  grade

b) 1NF

c) Student ( Student ID, Student Name, Campus address, major)

Course ( Course ID, Course title, instructor name)

Instructor ( instructor name, instructor location)

GradeReport ( Student ID, Course ID, Instructor name, grade)

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1NF

item\_shipment ( shipment ID, itemNo, type, Description, weight, quantity )

shipment ( shipment ID, origin, shipdate, destination, shipNumber, Expected date, Captain )

item shipment header 1NF من غير →

2NF (No partial dependencies)

item\_shipment ( shipment ID, itemNo, quantity )

item ( itemNo, type, description, weight )

shipment ( the same )

من غير 2NF من غير data →

1) insert anomaly :-

shipment أدخل item لا يمكن أدخل

2) delete anomaly :-

shipment أزيل item لا يمكن أزيل

3) update anomaly

shipment أزيل item لا يمكن أزيل في shipment  
الاستخدام



5 values

3NF (No transitive dependencies)  
not changed,

itemshipment ( shipment ID, item ID, Quantity )

item ( item No, type, description, weight )

changed

shipment ( shipment ID, origin, shipdate, destination, ship No, Expected date )

ship ( ship No, captain )

